MEMORANDUM

To:	EPA
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From:	J. Lambert, J. Brunelle
Subject:	Olin – Review Comments Regarding Revised Draft OU1 and OU2 Feasibility Study
Date:	7/24/2019

Nobis Group® (Nobis) on behalf of the U.S. Environmental Protection Agency (EPA), has reviewed and generated the following comments on the "*Revised Draft Operable Unit 1 & Operable Feasibility Study*" (OU1/OU2 FS) prepared by Wood Environment & Infrastructure (Wood) on behalf of the Olin Corporation (Olin) for the Olin Chemical Superfund Site (Site) in Wilmington, Massachusetts (Wood, 2019b).

The Revised Draft OU1/OU2 FS includes alternatives for OU1/OU2 sources not included in the Interim Action Feasibility Study (IAFS) submitted earlier (Wood, 2019a). Nobis' review comments are included below.

This review memorandum generally does not incorporate comments on the previously submitted OU1/OU2 FS (Wood, 2018) because the Revised Draft OU1/OU2 FS (Wood, 2019a) presents substantial changes over the previous document.

1.0 MAJOR COMMENTS:

Major comments on the Revised OU1/OU2 FS are provided by subject in the following subsections.

1.1 Introduction (1.0)

1. Section 1.4.2: See comments on Appendix A.
2. Section 1.4.3 (page 1-9): Olin states in the third paragraph that bis(2-ethylhexyl)phthalate (BEHP) in groundwater is not the source of BEHP in un-remediated sediment because BEHP was not detected in shallow overburden groundwater discharging to the South Ditch. Olin suggests that the historical source of BEHP was the overflow from Lake Poly to the former on-property West Ditch (which has been remediated).

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EPA's specific response #3 to the draft FS (EPA 2019, Appendix 6) suggests that accumulation of BEHP in sediment prior to excavation imply that BEHP could only have come from groundwater.

BEHP is not included in the IRWSP sediment sampling program. Given the lack of detections presented in the 2018 RI, there is insufficient data to contradict Olin' statements. If the most recent (2019) sampling results indicate that BEHP was not detected in groundwater near the South Ditch, we agree with Olin that sediment in the South Ditch and EA-5 do not appear to be contaminated or re-contaminated by a groundwater discharge of BEHP.

3. Section 1.4.3, chromium concentrations in sediment: The most recent sediment monitoring data is included in Semi-Annual Status Report (SASR) 24 (Wood, 2019c). Recent sediment concentrations at SD-SD2, SD-SD3, and SD-SD5 (2016-2017) have increased in concentration by more than 4x before returning to moderate (but still higher than previous) concentrations. This suggests that some degree of chromium recontamination may be occurring.
4. Section 1.4.3: See comments on Appendix A below for a discussion of potential sources of chromium impacts to groundwater.
5. Section 1.4.5, 1st paragraph: See comment on Appendix A below regarding additional support for discussion of background ammonia concentrations/concentrations indicative of high organic carbon.

1.2 Identification and Screening of Technologies (2.0)

6. Section 2.3.1: This section develops preliminary remediation goals (PRGs) for indoor air, but not for soil. Olin should develop PRGs for soil since the goal is to mitigate risks from trimethylpentenes (TMPs) volatilizing from soil into buildings or excavation areas. Although there are no vapor intrusion screening levels (VISLs) for soil, Olin could calculate PRGs by altering the formulas used in the Human Health Risk Assessment (HHRA).

1.3 Development and Screening of Alternatives (3.0)

7. Section 3.1 and Section 3.2.2.1: The list of general response actions (GRAs) for TMPs in soil should also include containment (e.g. installation of gas-impermeable barriers). While

Section 3.2.2.1 describes installation of vapor barriers as part of institutional controls, these should be addressed separately for full evaluation.

8. Section 3.2.2.1: This section removes ex-situ low temperature thermal desorption from consideration because of the exposure risks related to excavation of soils. This is reasonable. However, *in-situ* low temperature thermal desorption should be retained for consideration, as the installation of heating units would provide minimal disturbance.

   Low-temperature thermal desorption is used in combination with vapor extraction points and covers to minimize fugitive gases. Treatment times are also generally shorter than air sparging/ soil vapor extraction (AS/SVE). We recommend retaining in-situ thermal desorption at least through the costing analysis to provide an alternate treatment method.

   In-situ methods are advantageous because they minimize off-site impacts and future use restrictions. If in-situ thermal desorption is demonstrated to be infeasible due to costs or other feasibility concerns, then it may be dropped.

9. Section 3.2.2.3: This section removes groundwater controls from consideration because pumping groundwater would adversely impact the South Ditch and associated ecological receptors. Please provide further support for this reasoning. It may be possible to pump, treat, and then discharge groundwater to the head of the South Ditch to prevent dewatering the South Ditch.

1.4 Analysis of Alternatives (4.0)

10. Section 4.3.3.3 and 4.3.3.4: Alternative SW-2 includes a treatment barrier close to the property boundary to address downgradient surface water. This alternative does not include any treatment for the on-property portion of the South Ditch. The FS eliminates alternative SW-4 (permeable reactive barrier [PRB] installation) that *would* include groundwater treatment (and therefore surface water) along the length of the South Ditch.

    Olin should retain one alternative to address the upgradient portion of the South Ditch, which should be either Alternative SW-4 or a modification to SW-3 to include the upper reach of South Ditch.

1.5 Detailed Analysis of Alternatives (5.0)

11. Section 5.6.1 and Table 5.6-1: These do not provide effective comparisons between the alternatives and assume that all "action" alternatives (2 through 5) are equally protective. This is not the case. Without this differentiation, it is much harder to evaluate the reasoning for the selection of a recommended alternative. See below for a discussion of individual evaluation criteria:

    a) Overall protection of human health and the environment: alternatives that include leaving contamination in place and installing institutional and engineering controls (Alternative 2 and 3 for TMPs in soil) are less protective.

    b) Short-term effectiveness: alternatives that rely on monitoring rather than active treatment (Alternative 2 and Alternative 4 for South Ditch surface water) have lower short-term effectiveness.

    c) Long-term effectiveness and permanence: alternatives that rely on institutional and engineering controls rather than treating or removing the source (Alternative 2 and 3 for TMPs in soil) have a lower long-term effectiveness and permanence.

    d) Reduction of toxicity, mobility or volume through treatment: Alternatives 2 and 3 do not have a source treatment component for TMPs in soil, although they do prevent exposure. Therefore, they should score lower than active alternatives for TMPs in soil. Likewise, Alternatives 2 and 4 do not directly treat surface water or source groundwater. Alternative 5, which includes active treatment for TMPs in soil and surface water, would score the highest.

    e) Implementability: Alternatives involving monitoring only (such as Alternatives 2 and 4 for surface water) are more implementable than active treatment alternatives. Likewise, alternatives involving passive treatment or containment (such as Alternatives 2 and 3 for TMPs in soil) are more implementable than active treatment alternatives.

1.6 Appendix A: Evaluation of GW Interaction with South Ditch SW/Sediment

12. The text notes that concentrations of the monitored contaminants have declined since the OU1/OU2 RI (AMEC, 2015). Olin should provide new risks using a ratio approach if the

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newer data is comparable (same sample locations, same sample numbers, same exposure point concentration [EPC] approach). If concentrations have decreased by a certain percentage, the risks would also decrease by that percentage.

13. As described in EPA's comment response (Appendix 6, Specific Comment 29 in EPA, 2019), the PRG for ammonia should be 1.9 mg/L. This is based on site-specific pH and temperature and is consistent with the value used for the downstream Halls Brook Holding Area (Industri-Plex Superfund Site). Although ammonia concentrations (including those in groundwater further from the south ditch) have decreased significantly as noted in the charts on Figure A-1, they remain well above 1.9 mg/L.

14. Sanmina wells: Olin's CSM suggests that the concentration changes in the South Ditch are related to the cessation of pumping. If Sanmina well operation is reinstated, then Olin should evaluate the effects of this restart to contaminant concentrations in and along the South Ditch.

15. The figures show that the highest concentrations of ammonia and sulfate are consistently detected at GW-202D and PZ-16R. Concentrations are also high at wells east of the Containment Area and further downstream.

    Ammonia and sulfate concentrations have decreased at locations upgradient of GW-202S/D and PZ-16R (GW-24 and GW-25), and Wood's explanation of re-contamination followed by attenuation after Sanmina pumping ended, followed by further decreases in concentration due to dense aqueous phase liquid (DAPL) removal at the Off-Property West Ditch (OPWD) DAPL pool is reasonable. However, this does not explain the continued much higher concentrations at GW-202S/D and PZ-16R.

    The continued high concentrations at GW-202D relative to GW-202S and at this location compared to the rest of the South Ditch area suggest a more local (and potentially deeper) source. This pattern is more pronounced with chromium results that are significantly elevated only at GW-202D.

    Furthermore, decreasing concentration trend at GW-202D appears to be consistent since its 2008 peak. The trend appears to continue after the 2012 start of the DAPL removal pilot test. This suggests that the elevated concentrations at GW-202 may be from residual waste material or from some degree of leakage at the base of or beneath the slurry wall rather from impacts of pumping at the OPWD DAPL pool. Data from additional wells in this area from the recent comprehensive sampling may help to clarify these relationships.

16. Page A-5, first paragraph, ammonia reference value comparison for the South Ditch: Section 4.1.6 of the OU1/OU2 RI (Amec, 2015) states that reference or background sediment locations do not exist. Please clarify which soil and sediment samples are considered background for this OU1/OU2 FS.

    The discussion of ammonia in soil would benefit from a more complete discussion of typical ranges of ammonia concentrations in wetland soil, including references to other technical papers. “Normal for a wetland environment” needs additional support.

1.7 Appendix B: Evaluation of GW Interaction with East Ditch SW/Sediment

18. Introduction (1st paragraph): This states that base flows in the East Ditch are not high and therefore the ditch likely only captures a portion of the groundwater. In addition, the overburden wells east side of East Ditch are not impacted by Olin contamination.

    While this is true, there are no bedrock wells east of the East Ditch, close to Plant B. It is possible that contaminated groundwater passes beneath East Ditch and migrates via bedrock further east since the bedrock is shallow in this area. Additional bedrock well control would confirm Olin’s hypothesis.

19. Approach for Ecological Screening (page B-4): Wood assumes that the groundwater concentrations adjacent to Plant B and close to the East ditch (with no dilution) were representative of a worst-case scenario where the Plant B treatment system is no longer operating.

    The system was designed to prevent breakout of light non aqueous-phase liquid (LNAPL) into the East Ditch. Although LNAPL recovery has decreased substantially since system startup, Wood should include an evaluation of the potential quantity of LNAPL and resulting contaminant concentrations that may enter the East Ditch.

20. Re-Evaluation of the OU1/OU2 BHHRA for the East Ditch (page B-9):

    a) Wood notes that the periodic clearing and excavation of the East Ditch is performed with a rail-mounted excavator, and therefore a railroad maintenance worker would not have a complete exposure pathway. We agree that regular maintenance does not include contact; however, calculations should be considered for occasional non-routine utility work that may require contact.

b) EPCs should be recalculated for all detected analytes, not just BEHP, ammonia, iron, and TMPs.

21. Appendix B: This should include revised risk calculations in addition to the final risk results.

2.0 MINOR COMMENTS:

Minor comments are listed by report section below.

2.1 Section 1

1. Section 1.4.4: refer to major comments on Section 1.4.3 that discuss BEHP in groundwater discharge and chromium in sediment.
2. Section 1.5, page 1-13: see Appendix A comments regarding sources of ammonia to groundwater and therefore surface water.
3. Section 1.6.3, 4th bullet: the bullet notes that there are no ecological risk concerns in the portions of the area available for redevelopment. We suggest providing a short discussion of these areas in Section 1.6.2.

2.2 Section 2

4. Section 2, page 2-2: see Appendix A comments regarding sources of ammonia to groundwater and therefore surface water.
5. Section 2.3.3.1 - aerial extent of TMPs in subsurface soil: This section should include a reference to a figure depicting the TMP areas and concentrations. Olin's response to EPA's specific comment 33 stated that a figure delineating this area would be provided.

2.3 Section 4

6. Section 4.2.1: See major comment 8 above regarding evaluation of in-situ thermal desorption to treat TMPs.
7. Section 4.2.2, page 4-4: Please add a reference to the Construction-Related Release Abatement Measure here and to the reference list.

8. Section 4.2.3.2, page 4-5: The data evaluation included in Alternative SW-2 should include a re-evaluation of the HHRA based on more recent surface water data.

2.4 Section 5

9. Section 5.2.4 and 5.3.4: Long-term effectiveness and permanence is lower for the alternatives involving limited action for TMPs in soil (Alternative 2 and Alternative 3) because the contamination would remain in place. This should be acknowledged in the text.

2.5 Figures

10. Figure 2.3-3: Please provide sediment location IDs.

2.6 Tables

11. Section 5 ARAR tables (Table 5.1-1 through 5.1-3, Table 5.2-1 through 5.2-3, Table 5.3-1 through 5.3-3, Table 5.4-1 through 5.4-3, and Table 5.5-1 through 5.5-3): Olin should review these for applicability. The final column (action to be taken to attain requirement) should describe the specific action to be taken for each alternative. If an ARAR is not applicable, it should be removed. These tables should be specific to each individual alternative.

2.7 Appendices

12. Appendix B, Findings (page B-6): this paragraph notes that few groundwater concentrations in the target area are above ecological screening criteria and that "primary" exceptions include BEHP, iron, ammonia, and TMPs. The text describes these analytes in detail. The "Findings" section should include reference to Table B-1, which lists all detected results.

3.0 REFERENCES

Amec, 2015. Final Remedial Investigation Report, Operable Unit 1 & Operable Unit 2, Olin Chemical Superfund Site, Wilmington, Massachusetts. July 24.

EPA, 2019. EPA's Response to Olin's January 2, 2019 Response to EPA's Comments on Olin's Draft Remedial Investigation and Feasibility Study Reports Submitted on September 25, 2018. March 8.

Wood, 2019a. Draft Interim Action Feasibility Study, Olin Chemical Superfund Site, Wilmington, Massachusetts. April.

Wood, 2019b. Revised Draft Operable Unit 1 & Operable Unit 2 Feasibility Study, Olin Chemical Superfund Site, Wilmington, Massachusetts. May.

Wood, 201ca. Semi-Annual Status Report No. 24, Olin Chemical Superfund Site, 51 Eames Street, Wilmington, Massachusetts. July 3.